CLAIMS

We claim:

1. A method for metering and controlling the dispense rate of an in-mold coating composition into a mold cavity (16) and onto a thermoplastic molded article contained therein, the method comprising the steps of:

(a) injecting a heated thermoplastic material into said mold cavity (16);

(b) allowing said thermoplastic material to form a thermoplastic article in said mold cavity (16); and

(c) injecting an in-mold coating composition into said mold cavity (16) and onto said thermoplastic article, wherein both the amount of and rate that said coating composition is injected into said mold cavity (16) are controlled.

2. The method of claim 1 further comprising the step of maintaining mold members (12,14) that define said mold cavity (16) at a substantially fixed distance relative to one another throughout steps (a) through (c).

3. The method of claim 2 further comprising the step of maintaining said mold members (12,14) such that said mold cavity (16) has a substantially fixed volume in step (a) and the same said substantially fixed volume in step (c).

4. The method of any of claims 1 to 3 wherein said step of injecting said in-mold coating composition includes dispensing a first amount of said in-mold coating composition at a first rate sufficient to interpose said in-mold coating composition between said article and walls (34,36) defining said mold cavity (16) and dispensing a second amount of said in-mold coating composition at a second rate that is less than said first rate to avoid leakage of said in-mold coating composition through a parting line (22).

5. The method of claim 4 wherein the step of injecting said in-mold coating composition further includes dispensing a third amount of said in-mold coating composition at a third rate that is less than said second rate and sufficient to fully coat desired portions of said article.

6. The method of any of claims 1 to 5 wherein the amount of and the rate that said in-mold coating composition is injected into said mold cavity (16) is metered through the use of a linear transducer (110) in combination with a programmed logic controller.

7. The method of any of claims 1 to 6 wherein the control of the amount of in-mold coating composition injected includes the steps of:

using a hydraulic cylinder (102) with a piston (104) extending into a metering cylinder (64) of said in-mold coating composition to evacuate said in-mold coating composition from said metering cylinder (64) and direct said in-mold coating composition to said mold cavity (16);

measuring linear travel by said piston (104); and

operating said hydraulic cylinder (102) based on said linear travel measured.

8. The method of any of claims 1 to 7 wherein the control of the amount of and the rate that said in-mold coating composition is injected includes the steps of:

measuring the position of a piston (104) used to force said in-mold coating composition into said mold cavity (16); and

controlling the speed and distance said piston (104) travels based on measurements taken of said piston (104).

9. The method of any of claims 1 to 8 wherein the step of injecting said in-mold coating includes:

dispensing said in-mold coating composition from a metering cylinder (64) through a fluid line fluidly connected to said mold cavity (16); and

controlling the amount and rate of said in-mold coating dispensed from said metering cylinder (64).

10. An apparatus for controlling the amount and rate of an in-mold coating composition injected into a molding cavity (16) and onto a thermoplastic molded article formed therein, comprising:

(a) at least two mold members (12,14) defining said mold cavity (16);

(b) a first composition injector (30) fluidly connected to said mold cavity (16) for injecting a first composition into said mold cavity (16);

(c) a second composition injector (32) fluidly connected to said mold cavity (16) for injecting said in-mold coating composition into said mold cavity (16), said second injector including:

(i) a metering cylinder (64) fluidly connected to said molding cavity (16) and holding said in-mold coating composition,

(ii) a hydraulically driven piston (104) extending into said metering cylinder (64) for evacuating an amount of said in-mold coating composition held therein upon movement in a first direction of said piston (104),

(iii) a means for controlling said amount of said in-mold coating composition evacuated by said piston (104) from said metering cylinder (64), and

(iv) a means for controlling the rate that said piston (104) evacuates said in-mold coating composition from said metering cylinder (64).